STAT100 Problem Set 5
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Section 0122

1a.

```
> # Erik Ter-Gabrielyan
> x_values <- c(0,5,10,20,25)
> x_probs <- (1/3)-((x_values)/90)
```

Prize (X)	Probability P(X = x)
0	0.33333333
5	0.27777778
10	0.22222222
20	0.11111111
25	0.05555556

1b.

The two properties are that each probability is between zero and one, and the sum of each probability is one.

As seen in the table, every probability is between zero and one, and calculating the sum:

0.3333 + 0.2778 + 0.2222 + 0.1111 + 0.0556 = 1

Shows that it meets both criteria.

1c.

```
> # Erik Ter-Gabrielyan
> x_values <- c(0,5,10,20,25)
> x_probs <- (1/3)-((x_values)/90)
> mean <- sum(x_values*x_probs)
> mean <- sum(x_values*x_probs)
> mean
[1] 7.222222
```

1d.

P(X>5) = P(X=10) + P(X=20) + P(X=25) = 0.2222 + 0.1111 + 0.0556 = 0.3889

2a.

```
> # Erik Ter-Gabrielyan
> X_values <- c(0,1,2,3,4,5,6,7,8)
> X_probs <-  c(dbinom(X_values, size=8, prob=0.33))
> X_table2 <- data.frame(X_values,X_probs)
> names(X_table2) <- c("x","P(X = x)"); X_table2
```

Number of Adults with A-positive Blood (X)	Probability P(X = x)
0	0.0406067678
1	0.1600027864
2	0.2758256989
3	0.2717088974
4	0.1672834630
5	0.0659146779
6	0.0162327192
7	0.0022843485
8	0.0001406409

2b.

Mean = np

```
> mean = 8*0.33
> sd = (8*0.33*(1-0.33))^(1/2)
> mean
[1] 2.64
> sd
[1] 1.329962
```

Using rstudio, we find the mean is 2.64 and the sd is 1.329962.

2c.

SD = sqrt(np(1-p))

```
> mean = 8*0.33
> sd = (8*0.33*(1-0.33))^(1/2)
> mean
[1] 2.64
> sd
[1] 1.329962
```

Using rstudio, we find the sd is 1.329962.

2d.

Using the table above, we see the probability for exactly 3 out of 8 randomly selected adults have blood type A-positive (P(X=3)) is 0.272.

2e.

Using the table above, we see the probability for less than 3 out of 8 randomly selected adults having blood type A-positive (P(X<3)) is 0.476.

P(X<3) = P(X=0) + P(X=1) + P(X=2)
P(X<3) = 0.0406067678 + 0.1600027864 + 0.2758256989
P(X<3) = 0.476

2f.

Using the table above, we see the probability for between 2 and 4 out of 8 randomly selected adults having blood type A-positive ($P(X<3)$) is 0.715.

$P(2<=X<=4) = P(X=2) + P(X=3) + P(X=4)$
$P(2<=X<=4) = 0.2758256989 + 0.2717088974 + 0.1672834630$
$P(2<=X<=4) = 0.715$.